WHAT IS CLAIMED IS:

1. A method of functional brain mapping of a subject comprising the steps of:

(a) illuminating an exposed cortex of a brain or portion thereof of the subject with incident light;

(b) acquiring a reflectance spectrum of each picture element of at least a portion of the exposed cortex of the subject;

(c) stimulating the brain of the subject;

(d) during or after step (c) acquiring at least one additional reflectance spectrum of each picture element of at least the portion of the exposed cortex of the subject; and

(e) generating an image highlighting differences among spectra of the exposed cortex acquired in steps (b) and (d), so as to highlight functional brain regions.

2. The method of claim 1, further comprising the step of using at least one filter to adjust the spectrum of the incident light.

3. The method of claim 1, wherein each of steps (b) and (d) is independently characterized by spectral resolution ranging between 1 nm and 50 nm and spatial resolution ranging between 0.1 mm and 1.0 mm.

4. The method of claim 1, wherein each of steps (b) and (d) is effected via an interferometer-based spectral imaging device.

5. The method of claim 1, wherein each of steps (b) and (d) is effected via a filters-based spectral imaging device.

6. The method of claim 1, further comprising the steps of generating individual spectra-images from spectra acquired in steps (b) and (d).

7. The method of claim 6, wherein said spectral-images are generated by attributing each of the pixels in the images a distinctive color or intensity according to oxygen saturation and/or blood volume characterizing its respective picture element in the cortex.

8. The method of claim 1, wherein the subject is awake.

9. The method of claim 1, wherein the subject is anesthetized.

10. The method of claim 1, wherein step (c) is effected by asking the subject to perform a task.

11. The method of claim 10, wherein said task is selected from the group consisting of reading, speaking, listening, viewing, memorizing, thinking and executing a voluntary action.

12. The method of claim 1, wherein step (c) is effected by a method selected from the group consisting of passively stimulating the brain through the peripheral nervous system of the subject and directly stimulating the cortex.

13. The method of claim 1, further comprising the step of generating an anatomical image of the exposed cortex and co-displaying

said image highlighting differences among spectra of the exposed cortex and the anatomical image of the exposed cortex.

14. The method of claim 13, wherein said image highlighting differences among spectra of the exposed cortex and the anatomical image of the exposed cortex are co-displayed side by side.

15. The method of claim 13, wherein said image highlighting differences among spectra of the exposed cortex and the anatomical image of the exposed cortex are superimposed.

16. The method of claim 1, wherein step (e) comprises a use of at least one threshold while generating the image highlighting differences among spectra of the exposed cortex acquired in steps (b) and (d).

17. The method of claim 1, wherein said image highlighting differences among spectra of the exposed cortex acquired in steps (b) and (d) is color or intensity coded.

18. The method of claim 1, wherein medical lines are connected to the subject on a single side thereof.

19. The method of claim 1, wherein medical lines are connected to the subject on a right or left side thereof.

20. The method of claim 1, wherein medical lines are connected to the subject at locations which are less communicating with the exposed portion of the cortex of the subject.

21. The method of claim 7, wherein said step (e) is characterized by highlighting oxygen saturation and/or blood volume differences of about at least 10 %.

22. The method of claim 7, wherein said step (e) is characterized by highlighting oxygen saturation differences and/or blood volume of about at least 5 %.

23. The method of claim 8, further comprising the step of also acquiring a reflectance spectrum of each picture element of at least the portion of the exposed cortex of the subject when the patient is briefly anesthetized.

24. The method of claim 1, wherein each of steps (b) and (d) is performed during at least N brain beats of the subject, wherein N is an integer selected from the group consisting of two, three, four, five, six, seven, eight, nine, ten and an integer between and including eleven and forty.

25. The method of claim 1, wherein step (d) is executed more than about 3-5 seconds after initiation of step (c).

26. The method of claim 1, wherein step (d) is executed between about 5 and about 30 seconds after initiation of step (c).

27. The method of claim 1, wherein said stimulation prolongs about 5 to about 30 seconds.

28. The method of claim 1, wherein said stimulation prolongs about 10 to about 20 seconds.

29. The method of claim 5, wherein said filters-based spectral imaging device includes filters selected so as to collect spectral data of intensity peaks or steeps characterizing one or more spectrally monitored substances.

30. The method of claim 5, wherein said filters-based spectral imaging device includes filters selected so as to collect spectral data of intensity peaks or steeps characterizing hemoglobin selected from the group consisting of deoxy-hemoglobin, oxy-hemoglobin and deoxy-hemoglobin and oxy-hemoglobin.

31. The method of claim 30, wherein each of said filters is individually about 5 to about 15 nm full-width-at-half-maximum filter.

32. The method of claim 30, wherein each of said filters is individually about 10 nm full-width-at-half-max filter.

33. The method of claim 30, wherein said filters include N filters selected from the group consisting of an about 540 nm maximal transmittance filter, an about 575 nm maximal transmittance filter, an about 555 nm maximal transmittance filter, an about 513 nm maximal transmittance filter and an about 600 nm maximal transmittance filter, whereas N is an integer selected from the group consisting two, three, four and five.

34. The method of claim 33, wherein N equals two.

35. The method of claim 33, wherein N equals three.

36. The method of claim 33, wherein N equals four.

37. The method of claim 33, wherein N equals five.

38. The method of claim 30, wherein said filters include at least one multiple chroic filter.

39. The method of claim 30, wherein said filters include at least one filter of maximal transmittance at a wavelength which corresponds to at least one isosbasthic point of deoxy-hemoglobin and oxy-hemoglobin and at least one additional filter of maximal transmittance at a wavelength which corresponds to at least one non-isosbasthic point of deoxy-hemoglobin and oxy-hemoglobin.

40. The method of claim 1, wherein said reflectance spectrum of step (b) is an averaged reference spectrum of N measurements, wherein N is an integer and equals at least 2.

41. The method of claim 1, wherein said reflectance spectrum of step (d) is an averaged reference spectrum, wherein N is an integer and equals at least 2.

42. The method of claim 1, further comprising the steps of spatially registrating spectral data acquired in steps (b) and (d).

43. The method of claim 1, wherein said image highlighting differences among spectra of the exposed cortex acquired in steps (b) and (d) is highlighting oxygen saturation and/or blood volume differences.

44. The method of claim 43, wherein step (e) comprises a use of at least one threshold while generating the image highlighting differences among spectra of the exposed cortex acquired in steps (b) and (d) of oxygen saturation and/or blood volume differences.

45. The method of claim 44, wherein said at least one threshold includes taking into account only picture elements in which, in step (b), in step (d) or both, an absolute oxygen saturation and/or blood volume is above a predetermined first threshold.

46. The method of claim 45, wherein said at least one threshold further includes taking into account only picture elements in which a difference in oxygen saturation and/or blood volume is above a predetermined second threshold.

47. The method of claim 46, wherein clusters of neighboring picture elements above said first and said second threshold, said clusters include less than a predetermined number picture elements, are discarded.

48. The method of claim 44, wherein said at least one threshold includes taking into account only picture elements in which a difference in oxygen saturation and/or blood volume is above a predetermined threshold.

49. The method of claim 44, wherein said at least one threshold is effected by discarding clusters of neighboring picture elements which include less than a predetermined number picture elements highlighting differences among spectra of the exposed cortex acquired in steps (b) and (d) of oxygen saturation and/or blood volume differences.

50. The method of claim 6, wherein said step of generating individual spectra-images from spectra acquired in steps (b) and (d) includes generating color or intensity coded saturation and/or blood volume maps.

51. The method of claim 50, wherein said coded saturation maps are coded oxygen saturation maps.

52. The method of claim 50, further comprising the step of generating an anatomical image of the exposed cortex and co-displaying at least one of said color or intensity coded saturation and/or blood volume maps and the anatomical image of the exposed cortex.

53. The method of claim 52, wherein said anatomical image is a monochromatic image.

54. The method of claim 52, wherein said anatomical image is a grayscale image.

55. The method of claim 52, wherein said anatomical image is a red-green-blue image.

56. The method of claim 52, wherein at least one of said color or intensity coded saturation and/or blood volume maps and the anatomical image of the exposed cortex are co-displayed side by side.

57. The method of claim 52, wherein at least one of said color or intensity coded saturation and/or blood volume maps and the anatomical image of the exposed cortex are superimposed.

58. The method of claim 1, wherein said image highlighting differences among spectra of the exposed cortex acquired in steps (b) and (d), so as to highlight functional brain regions, is coded via color or intensity so as to distinguish degree of said differences in accordance with at least one difference threshold.

59. The method of claim 13, wherein said anatomical image is a monochromatic image.

60. The method of claim 13, wherein said anatomical image is a grayscale image.